

## REMARKS

### *Status of Claims*

Claims 1 – 36 were original in the application. Claims 37 - 45 were previously added. Claims 2 – 10, 14 – 24, 26, 32, 41, 42 and 44 have been cancelled. Claims 1, 11, 13, 25, 27, 31, 34, 37, 43, and 45 have currently been amended. Claims 1, 11 - 13, 25, 27 – 31, 33 – 40, 43 and 45 are submitted as being set forth in a clearly allowable condition or at least in a better form for appeal. Entry of the amendments is solicited.

### *Rejection Pursuant to 35 USC 112*

Claims 1, 11 and 12 continue to be rejected under sec. 112, first paragraph. The Examiner's rejection is unclear, but it is assumed that claim 1 is rejected for; (1) failure to include the limitation that cryomilling occurs before thermally spraying and (2) this order of steps is not disclosed. The Examiner has abandoned the earlier contention that these limitations must be expressly recited in the claims.

Claim 1 does expressly claim cryomilling or thermally spraying steps, but more broadly claims providing a bond coat. Therefore, the rejection is inapplicable to claim 1 and cannot be sustained.

Claim 11 meets the objection by expressly calling for the steps of cryomilling and disposing the **cryomilled** coating onto the bond coat. Clearly, the step of cryomilling must precede the step of disposing the **cryomilled** coating, otherwise the coating could not be cryomilled.

Claim 12 depends on claim 11 and further limits the step of disposing to the step

of plasma spraying.

The specification must be read from the position of one with ordinary skill in the art. It is notorious in the art that one must process the metallic powder before its thermally sprayed and bonded to the substrate and that there is no logical way in which to cryomill a powder after it has been thermally sprayed and bonded to the substrate. To assume such a possibility is to read the specification with virtually no skill in the art and to contemplate a logical absurdity. A modicum of technical knowledge must be credited to the interested member of the public who reads the disclosure. To require every absurdity to be expressly excluded by a literal disclosure of the excision of such a possibility or to require literal inclusion of notoriously well known background or simple logic is the not the standard of section 112. A patent application is not a mathematical system in which all the obvious axioms must be stated, but it is a disclosure stated with the implicit inclusion of what is ordinarily known as unstated.

In any case, paragraph [0023] states:

[0023] In another embodiment, the nanostructured, nano-composite bond coat comprises a **MCrAlY powder cryomilled** in the presence of oxygen, where M stands for either Co, Ni and/or Fe, such that aluminum oxide is formed in the cryomilled powder to serve as a nucleation site for further alumina formation in the top coat and **which cryomilled powder is disposed onto the substrate using a high velocity oxy fuel (HVOF) or low pressure plasma spray (LPPS) thermal spray process.**

The powder is again cryomilled before being disposed on the substrate and not afterwards, which is in any case impossible.

Claims 37 – 40 and 43 are rejected under section 112, first paragraph, for claiming a “fully nanocrystalline MCrAlY” layer. The specification is replete with references to the fact that the disposed layer is a nanocrystalline MCrAlY layer without

any other metallic alloys in it, or rather that the metallic alloy system used in the layer is only constituted of MCrAlY. It is not disclosed that NiAl is included as is the disclosure in Hebsur. The metallic alloy systems used in the claimed invention and in Hebsur are for this reason different. The inclusion of alumina does not alter the truth of the statement that the nanocrystalline MCrAlY bond coat is disposed on the substrate without inclusion of other metallic alloys. There are an infinity of possible substances, both plausible and implausible, that could alleged to be included with the MCrAlY bond coat, such as NiAl or peanut butter. Section 112 does not require that all things which are not included be disclosed. The disclosure would be endless. However, what was disclosed was disposition of a metallic alloy bond coat based only on MCrAlY without other metallic alloy inclusions. One with ordinary skill in the art would understand this from reading the disclosure. Applicant intended to include this limitation as disclosed with the term, "fully nanocrystalline MCrAlY" as the most accurate way of stating it. An alternative statement of "a nanocrystalline MCrAlY bond coat on the substrate without inclusion of other metallic alloys" is offered for entry.

All claims rejected under section 112, second paragraph, have been responsively amended.

### ***Claim Rejections - 35 USC § 102***

Claims 1, 13, 25, 27, 31, 33 and 37 continue to be rejected as being anticipated by Hebsur US Patent 6,805,725.

The Examiner admits that Hebsur '725 discloses a NiAl and CoCrAlY system.

Each of the rejected claims is limited to bond coat composed substantially of

nanocrystalline MCrAlY without inclusion of other metallic alloys. The claim does not read on Hebsur '725 and therefore cannot be anticipated by it.

*Rejection Pursuant to 35 USC 103(a)*

Claim 45 continues to be rejected as obvious over Hebsur '725. The Examiner contends that cryomilling occurs with an equivalent model to the 1-S attritor. While this statement, to the extent understood, appears to be correct, it does not serve as a ground under which use of a 1-S attritor has an obvious advantage in the claimed context. The applicant has determined that the size and nature of nanocrystalline grains created when cryomilling with an 1-S attritor, which is characterized by a low speed rotor, surprisingly creates the bond coating with additive  $\text{Al}_2\text{O}_3$  having the performance characteristics disclosed. There is no citation given that the cryomilling provided by the 1-S attritor would be expected to provide any particular advantage. Though the limitation is simply stated, the needed motivation, suggestion, inference or leading from the prior art is totally missing.

Claims 11, 12, 28, 29, 34, 35, 38, 39 and 43 were rejected as obvious over Hebsur '725 and '654. The Examiner admits that Hebsur '725 and '654 only teach in situ formation of alumina in a NiAl system and that Hebsur '725 does not teach formation of alumina during cryomilling<sup>1</sup>.

Claims 11, 12, 28, 29, 34, 35, 38, 39 and 43 are directed to a step of providing a alumina coating by cryomilling an alumina powder to achieve nanocrystalline grain sizes

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<sup>1</sup> See page 9 of the Office Action in reference to claims 34, 35.

and disposing the cryomilled nanostructured alumina composite coating on a bond coat on the substrate. Nothing in Hebsur '654 is related to nanocoating bond coats.

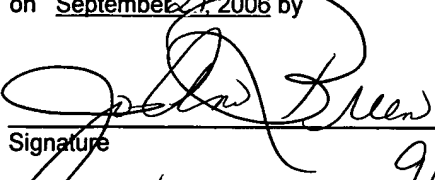
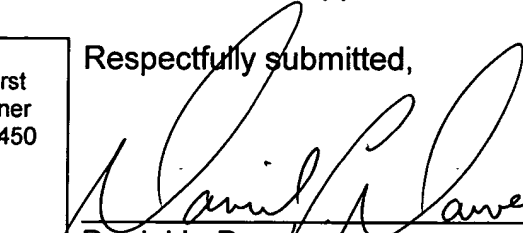
Therefore, the 103 rejection of claims 11 and 12 cannot be sustained.

Claims 31 and 33 were rejected as obvious over Hebsur '725 in view of a new reference, Cybulsky US Patent 6,168,875. Cybulsky disclosed a MCrAlY protective coating 18 disposed between a substrate 12 and a bond coat 20 of Ir-Nb alloy. Hebsur teaches a NiAl/MCrAlY bond coat system. At most the combination of Cybulsky with Hebsur might suggest placing a second layer of MCrAlY between the NiAl/MCrAlY bond coat and the substrate. However, there is nothing to suggest that the second layer of MCrAlY must be a nanostructured nano-composite layer. Cybulsky is totally silent with respect to the crystalline structure or sizing of the second layer of MCrAlY and never mentions cryomilling in any context. Cybulsky's second layer is for protection of the substrate against oxidation and hot corrosion and has no connection with bonding. There is no leading whatsoever that this characteristic would be important for an intermediate bond coat or that the MCrAlY would need a nanostructured nano-composite second bond coat underneath it. Claim 33 adds further limitations relating to how the nano-composite is structured or prepared. Thus, a limitation of claim 31 is not suggested, motivated, taught or inferable from the combination of Hebsur and Cybulsky.

Claims 34 and 35 were rejected as obvious over Hebsur '725 in view of Cybulsky. Hebsur '654 is mentioned for teaching in situ alumina and aluminum nitride formation during cryomilling. The Examiner concludes that this implies that Hebsur '725 in view of Cybulsky already includes AlN particles in the bond coat.

The posed reasoning is not clear since Cybulsky is utterly silent with respect to alumina and aluminum nitride formation and does not disclose anything in regard to cryomilling. Further, it has been admitted by the Examiner that Hebsur '725 does not teach alumina formation during cryomilling. Therefore, the combination of Cybulsky and Hebsur '725 cannot logically teach anything about refining the microstructure of the MCrAlY powder to nanocrystalline grain size after cryomilling through the introduction of  $\text{Al}_2\text{O}_3$  particles during cryomilling which is the subject of claims 34 and 35. Whether or not in situ AlN is somehow formed in the bond coat of Hebsur '725 is further irrelevant to the claimed subject matter of claims 34 and 35 where alumina is added to the powder during cryomilling.

Applicant respectfully requests advancement of the claims to allowance or entry of the amendments as placing the claims in a better form for appeal.

<p>I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on <u>September 21, 2006</u> by</p> <p> Signature <u>September 21, 2006</u> 9/21/06</p>	<p>Respectfully submitted,</p> <p> Daniel L. Dawes Registration No. 27,123 Myers Dawes Andras &amp; Sherman LLP 19900 MacArthur Blvd., 11<sup>th</sup> Floor Irvine, CA 92612 (949) 223-9600</p>
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